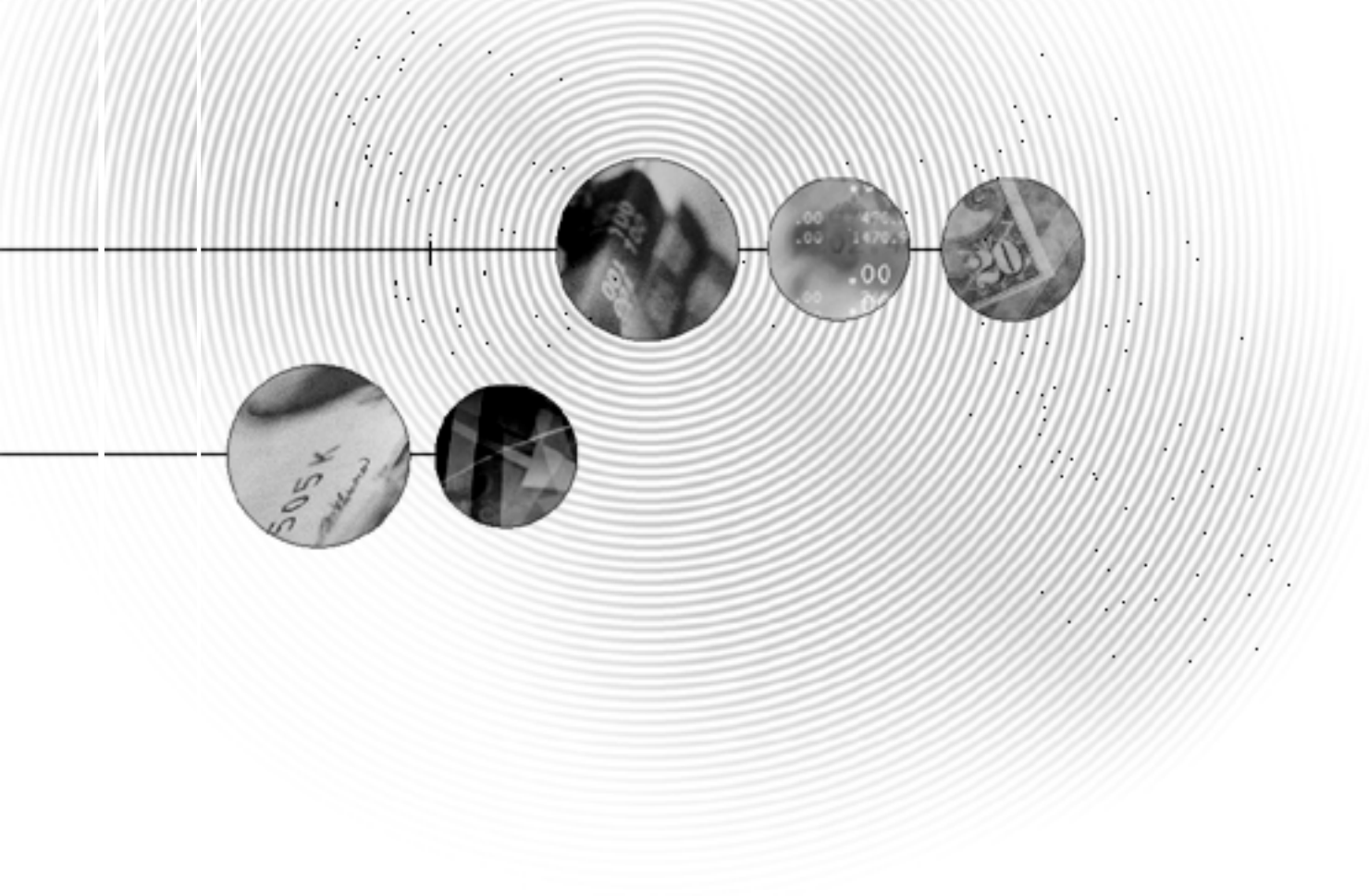
FXS Digital Communications System

Installation and Application Instructions for the Motherboard-Based System Computer Components



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Accordingly, some features identified in this publication will not operate if some other feature is activated. Comdial disclaims all liability relating to feature non-compatibility or associated in any way with problems which may be encountered by incompatible features. Notwithstanding anything contained in this publication to the contrary, Comdial makes no representation herein as to the compatibility of features.

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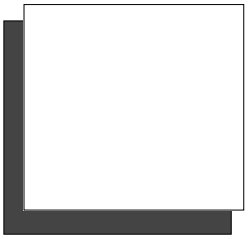


Contents

1 Introducing The FX Series System Computer Components 1-1

Handling Static-Sensitive Components 1-2

2 Installing The Computer Motherboard. 2-1

Installing The Motherboard 2-1

Detailing The Motherboard Device Locations 2-2

3. Installing The FX Series System Computer Power Supply 3-1

Installing The Power Supply 3-1

Connecting Power To The Internal Components 3-2

Connecting AC Power 3-3

4. Installing The Hard Disk Drive 4-1

Installing The Hard Disk Drive 4-1

Mounting The Hard Disk Drive In The Cage 4-1

Mounting The Drive Cage In The Cabinet 4-2

Connecting The Hard Drive 4-3

Connecting The Hard Disk Drive Power Plug 4-3

Connecting The Hard Disk Drive IDE Data Cable 4-3

5 Installing The Floppy Disk Drive 5-1

Installing The Floppy Disk Drive 5-1

Mounting The Floppy Disk Drive In The Cage 5-1

Mounting The Drive Cage In The Cabinet 5-2

Connecting The Floppy Disk Drive. 5-3

Connecting The Floppy Disk Drive Power Plug 5-3

Connecting The Floppy Disk Drive IDE Data Cable 5-4

6 Installing The Compact Disk (CD–ROM) Drive 6-1

Installing The CD–ROM Drive 6-1

Connecting The CD–ROM Drive 6-2

Connecting The CD–ROM Drive Power Plug 6-3

Connecting The CD–ROM Drive IDE Data Cable 6-3

7. Installing The Video Card 7-1

8. Installing The Serial Port Expansion Card 8-1

9. Installing The IVPC 9-1

Understanding The IVPC Characteristics 9-1

Installing The IVPC 9-2

Programming The Telephone System For IVPC Operation 9-4

Troubleshooting The IVPC Installation 9-4

10. Installing The Network Interface Card 10-1

Installing The Network Card 10-1

1 Introducing The FX Series System Computer Components

The FX Series system computer consists of the following elements:

- motherboard,
- power supply assembly,
- disk drives—includes hard drive, 3.5 inch floppy drive, and compact disk (CD-ROM) drive,
- individual, application-specific circuit cards—includes:
  - video card,
  - voice card,
  - network card.

You may find that the factory has installed everything that your system needs, and you do not need to install any of these elements during initial installation. However, if you need to add or replace a part in the field at a later date, you will need some instruction. This publication serves that purpose by describing the installation of the basic elements into the FX Series system computer. This publication also includes any unique setup and application information needed to make a particular element fully operational.

Handling Static-Sensitive Components

A computer circuit board is a very sensitive assembly and is susceptible to damage caused by electrostatic discharge. You can damage its components very easily by handling the circuit board improperly. This damage is not easily detectable yet may cause critical data errors during operation. Electrostatic discharge damage is permanent—it cannot be repaired; therefore, you must take precautions to prevent it from occurring.

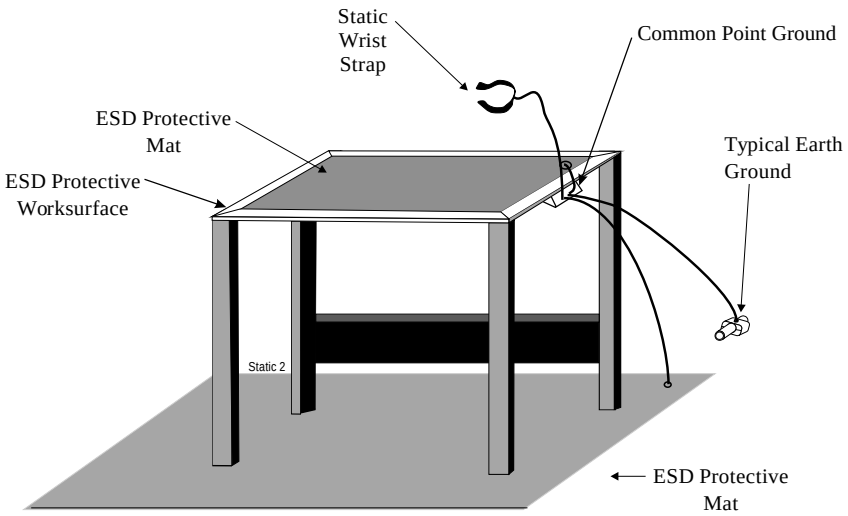
You can refer to Comdial publication IMI01-005, *Handling Of Electrostatically Sensitive Components*, for general electrostatic discharge information. The following paragraph discusses specific handling precautions that will help prevent electrostatic discharge damage.

Before handling any circuit board in the FX Series common equipment cabinet, place the cabinet on a conductive mat, and ground that mat to a good earth ground. (The third wire ground of the AC power line is an acceptable grounding point.)
A grounded conductive mat provides a safe electrostatic discharge path. Always prepare such a static-safe work area, and place the equipment cabinet on it before you service any circuit boards.

Always supply yourself with a static discharge wrist strap, properly ground it to a good earth ground, and wear it every time you handle electronic circuit boards. (The factory includes a static discharge wrist strap for your use with the FX Series system.)

- Install your static discharge wrist strap on your bare wrist, and adjust it for a snug fit. Be sure that the strap is touching bare skin and is not isolated by clothing.
- Connect the wrist strap cord between the wrist strap and an AC or earth ground

The factory ships uninstalled circuit boards for the FX Series system in static protection bags for safe keeping. Keep a board in its bag until you get it to a static-safe work area and are properly wearing a static discharge wrist strap. You can then safely remove the board from its static protection bag and install it in the system.



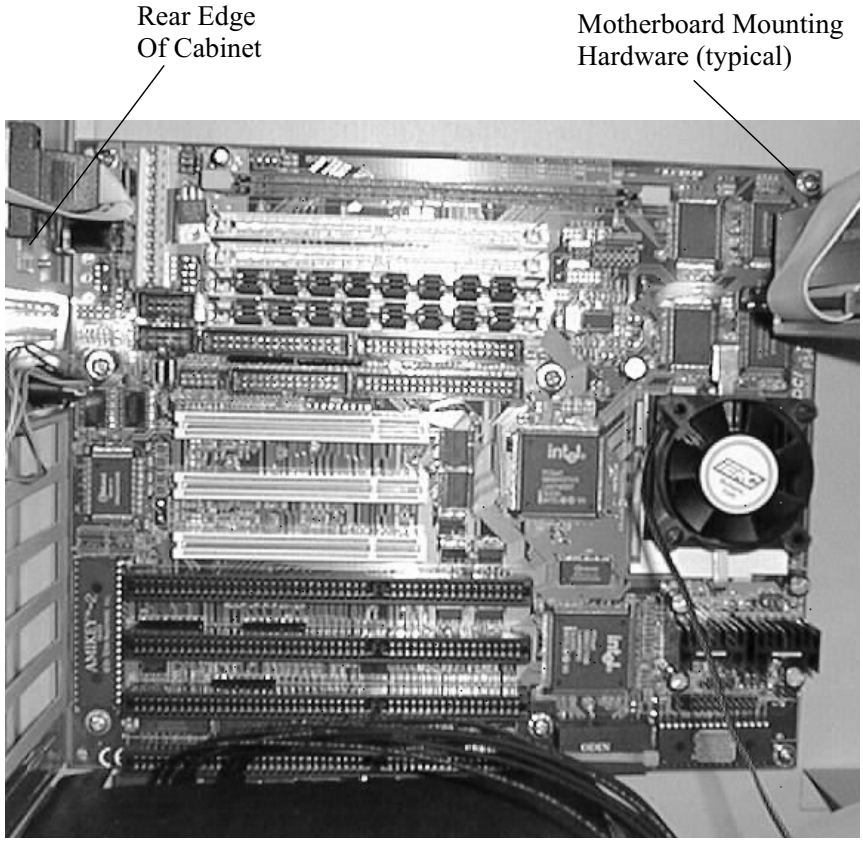
Detailing A Static-Safe Work Area

2 Installing The Computer Motherboard

The motherboard is the main circuit board of the FX Series system computer. Its components provide the processing and timing operations that are the heart of the computer's functionality. The motherboard contains sockets and edge connectors that provide receptacles for memory components that store the data the computer needs to function properly and for the special-purpose circuit cards that serve the many applications the computer may control.

Installing The Motherboard

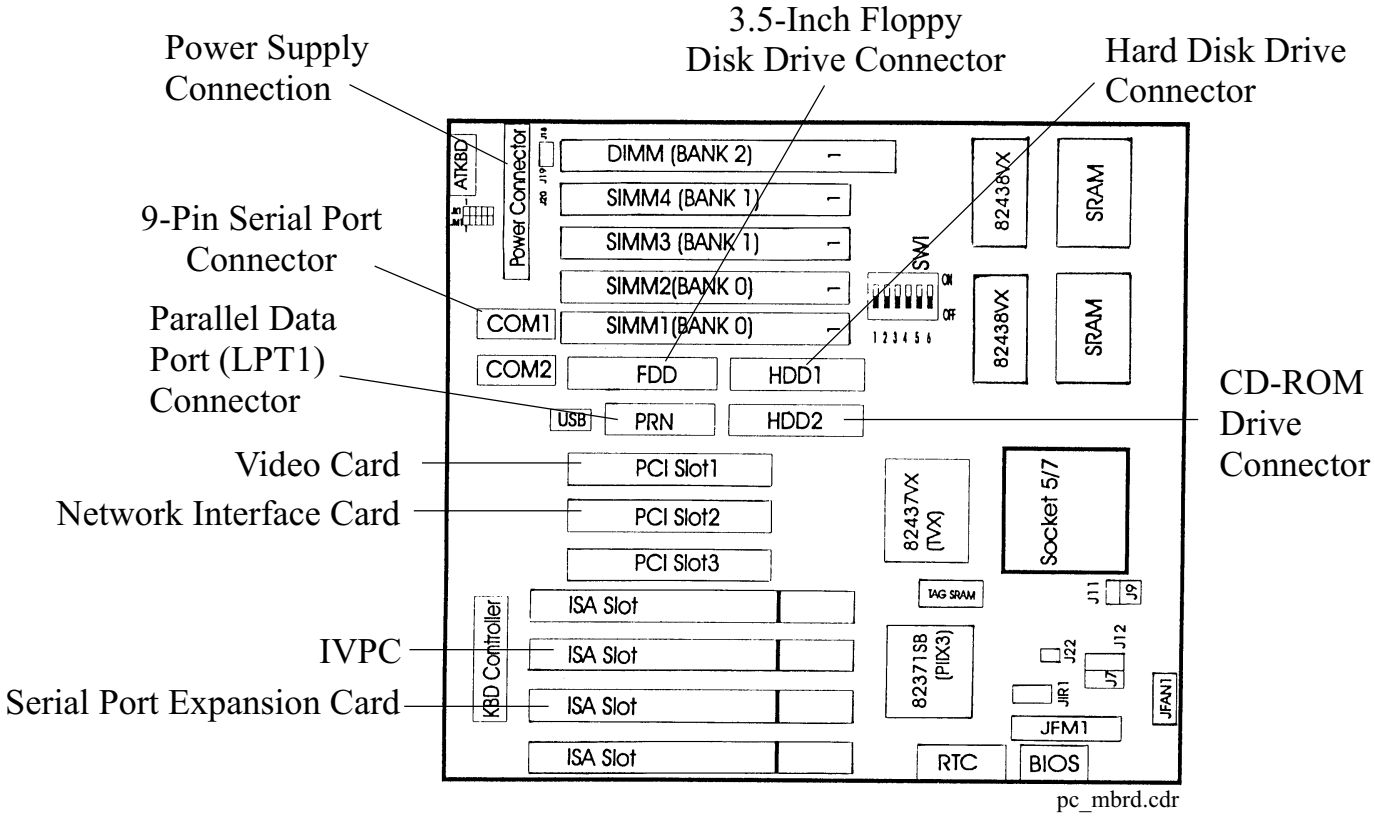
While adhering to the electrostatic discharge precautions detailed in Chapter One,
remove the motherboard from its static protection bag,
attach it at the top of the FX Series equipment cabinet using the supplied hardware.



Installing The Motherboard

Detailing The Motherboard Device Locations

Once you have installed the motherboard and tightened its mounting hardware, you should locate the device connections in preparation for making those connections as needed for your installation.



NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Device Connections

3 Installing The FX Series System Computer Power Supply

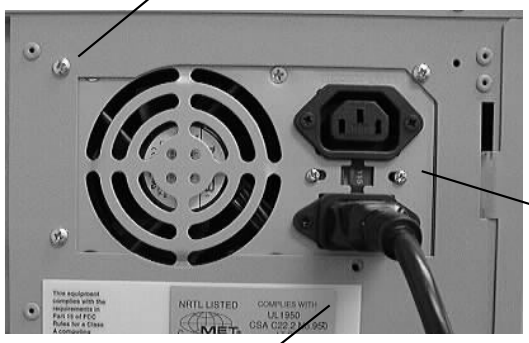
The power supply provides the power needed to run the FX Series system computer motherboard, its special-purpose circuit cards, the floppy disk drive, the hard disk drive and the compact disk drive. The power supply delivers either 110 VAC or 220 VAC depending upon the setting of a switch.

CAUTION

Be sure the switch setting matches the local voltage specifications.

Installing The Power Supply

The computer power supply is located in the opening at the top right rear of the common equipment cabinet. It attaches to the cabinet with three supplied machine screws.


Secure the computer power supply to the common equipment cabinet with three supplied screws.
Computer Power Supply
pc_ps.cdr
Top Right Rear Of The Common Equipment Cabinet

Locating The Computer Power Supply

Connecting Power To The Internal Components

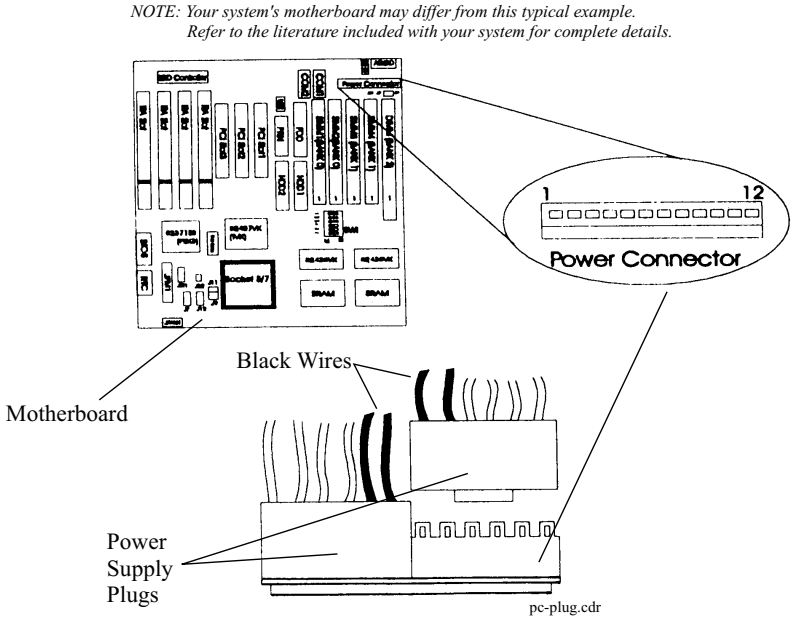
The computer power supply has a multipurpose power cable as an integral part of its assembly. This cable terminates in several connectors of different types to mate with various computer components. In general, the connectors are keyed for proper insertion; however, there are several items that you must take into consideration.

1. While the two power plugs for the motherboard are keyed so that they mate with the motherboard connection in only one direction, it is possible to reverse the position of these two plugs. To avoid this reversal,

   (a) note that each plug has two black wires along with several other wires of different colors,

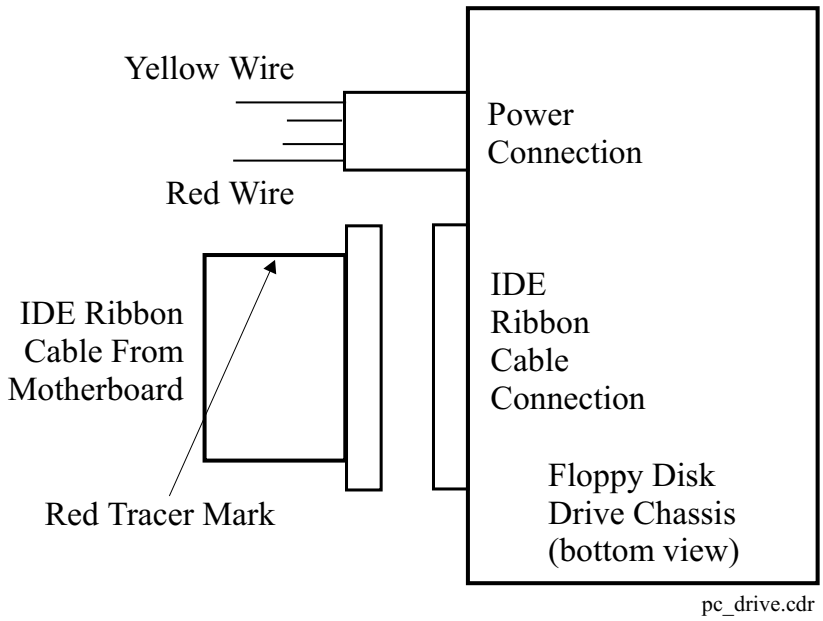
   (b) orient these two plugs so that the black wires in each connector are next to each other and located at the center of the motherboard connector,

   (c) press the plugs onto the motherboard connector in this orientation.



Orienting The Motherboard Power Plugs

2. The large white power plugs for the drive assemblies are keyed and will mate with their corresponding connectors on the drives in only one orientation. The floppy disk drive requires a small power plug, and this plug is not keyed. It is possible to improperly plug the small plug onto its mate on the drive chassis. To insure that you mate the plug and connection properly, orient the plug so that its red wire is closest to the IDE ribbon cable connector and its yellow wire is closest to the edge of the drive assembly chassis.



Orienting The Floppy Drive Power Plug

Connecting AC Power

For the AC power connection to the power supply, use the same dedicated, 115VAC 15 AMP circuit, with a third-wire ground, supplied to a standard electrical outlet (NEMA 5-15R), and protected by its own circuit breaker that you use for the telephony portion of the system.

NOTE: While you may notice a physical difference in the appearance of the two supplied AC power cables, there is no electrical difference. You can interchange the two AC power cables between the telephony and computer portions of the FX Series system as you see fit.

To provide protection against surges and spikes that may appear on the AC line to the computer portion of the FX Series system, install a plug-in power line surge protector between the AC power cord of the installed equipment and the AC outlet. Normally, you can use one multi-outlet surge protector for both the telephony and computer portions of the FX Series system.

The equipment cabinet employs a fan-cooled power supply; do not block the air flow to this fan.

CAUTION

Per Underwriter Laboratory (UL) requirements, DO NOT attach or secure the AC power cable to the surface of the mounting location in any manner.

ac_cord.cdr

Connecting The AC Power Cable

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4 Installing The Hard Disk Drive

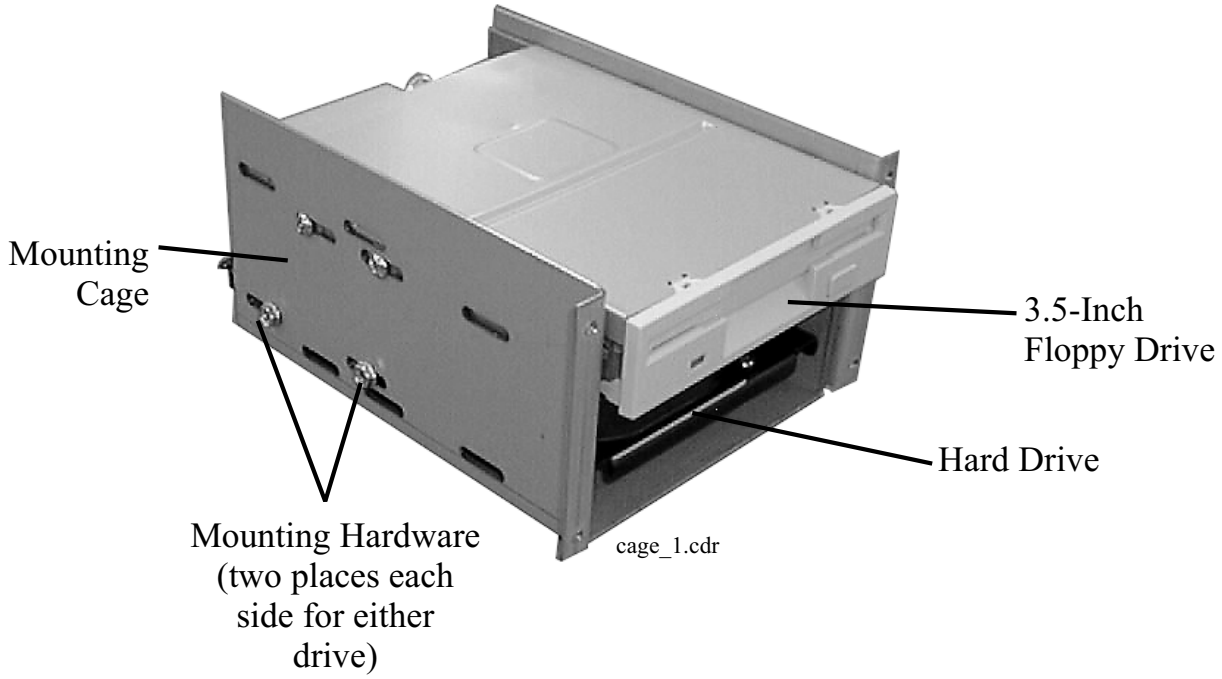
The FX Series system computer provides a hard disk drive assembly. The hard disk drive mass storage unit used for storing large amounts of data for the Computer/Telephony Integration (CTI) features that the FX Series system provides.

Installing The Hard Disk Drive

The hard disk drive mounts in a drive cage along with the computer's floppy disk drive assembly. The cage mounts in an opening at the top front of the FX Series common equipment cabinet.

Mounting The Hard Disk Drive In The Cage

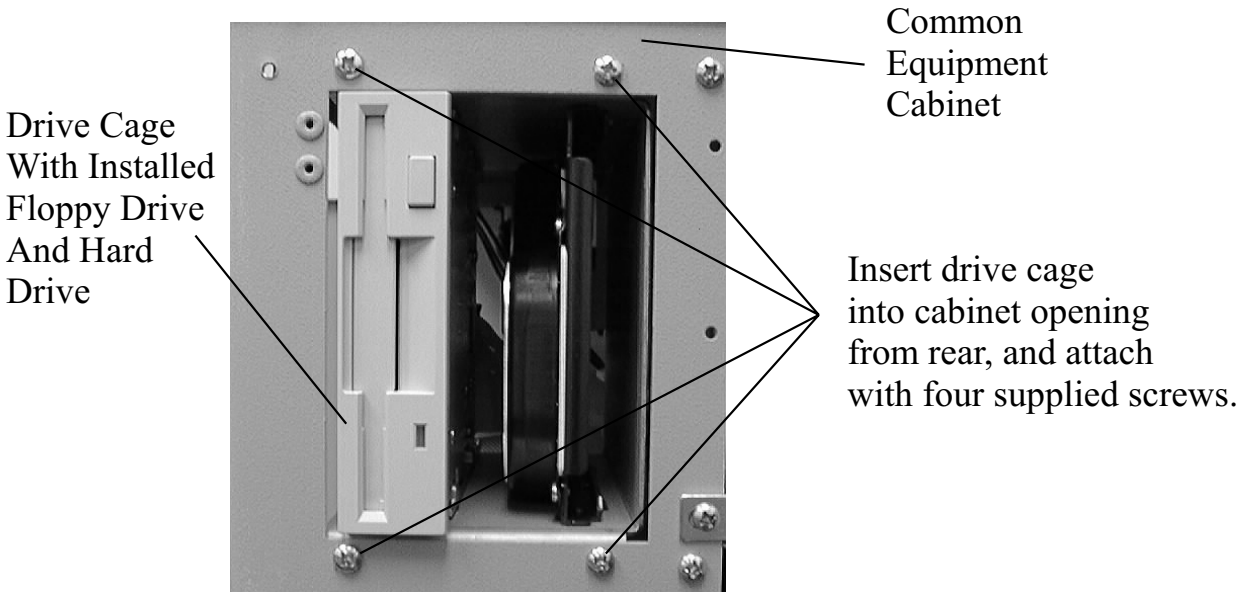
Mount the hard disk drive in the drive cage and attach it to the cage with the four supplied screws—two on each side of the cage.



Installing The Drive In The Drive Cage

Mounting the Drive Cage In The Cabinet

Mount the drive cage in the common equipment cabinet by inserting it from the inside of the cabinet into the opening at the top front of the cabinet, and attaching it with the four supplied screws.



Installing The Drive Cage In The Cabinet

Connecting The Hard Disk Drive

There are two cable connections that you must make to the floppy disk drive—the power connection, and the IDE data connection.

Connecting The Hard Drive Power Plug

The computer power supply's multipurpose cable provides a plug that mates with the hard disk drive power connector. To make the power connection take the following steps:

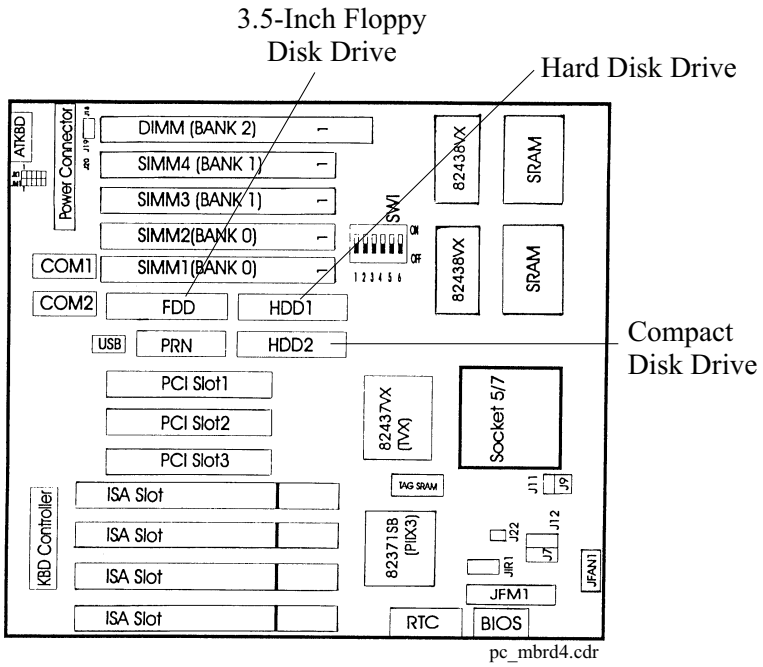
1. Locate one of the large white plugs attached to the power cable bundle. There are several plugs available. Choose the plug that is most convenient to use.

2. The power plug is keyed—it is not possible to connect it improperly. Simply locate the hard drive's power connection at the rear of the hard drive assembly chassis, and mate the connectors.

Connecting The Hard Drive IDE Data Cables

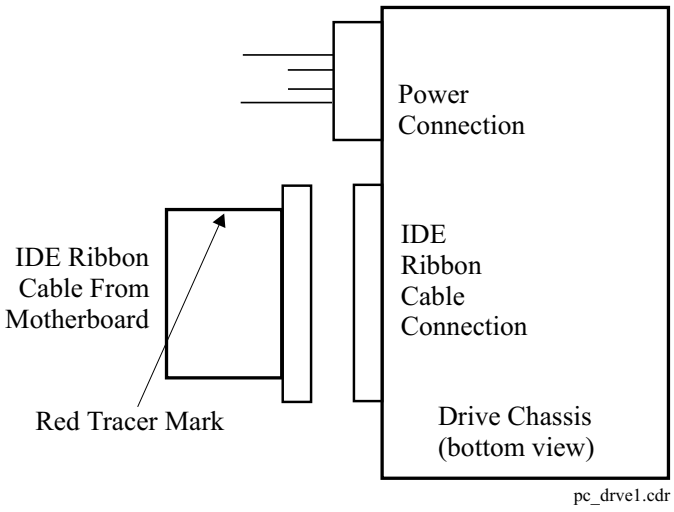
The IDE data cables are the flat ribbon cables that connect between the computer's motherboard and the hard disk drive. The IDE cables are keyed on the motherboard end. You can only connect them to the motherboard in one orientation. This is not the case when you connect them to the drive assemblies. At these connections, **there are two considerations that you must note:**

1. IDE ribbon cables provide several connectors along their length. This allows one data cable to serve two drives when that need occurs. In the case of the drive assemblies in the FX Series system computer, use the first connector on the cable that properly mates with the drive's IDE data connector.



NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Motherboard's Hard Drive IDE Connection



Orienting The IDE Connection

2. The IDE connector is not keyed at the drive end. The proper orientation is to connect the pin 1 of the ribbon cable connector to the pin 1 of the disk drive connector. Another method to help orient the connection properly is to align the cable connector so that its red tracer is closest to the drive's power connector. Sometimes it is hard to discern these connector markings making it possible to mate the connection improperly. A sure indication of improper connection is a steady-on condition of the disk drive's status light when you operate the drive. Should the drive's status light remain on steady, power down the system, and reverse the mating of the drive's IDE connection.

5 Installing The Floppy Disk Drive

The FX Series system computer provides a 3.5-inch floppy disk drive. You can use this drive to load programs and software data into the computer's memory and to store data that the computer has generated.

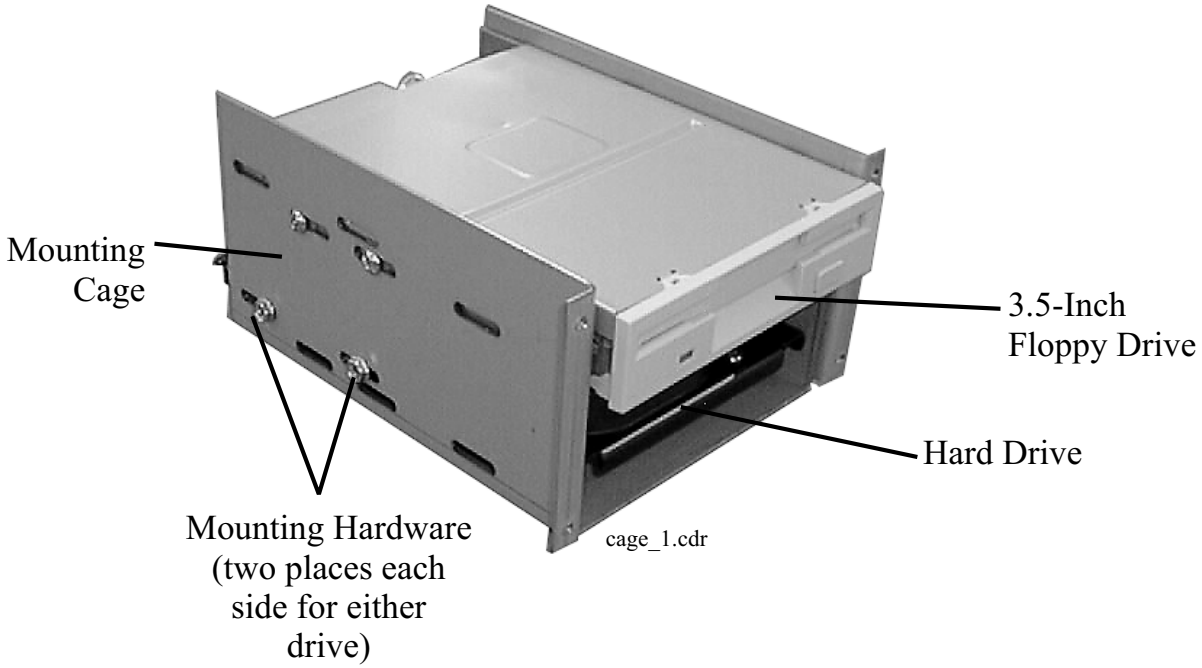
NOTE: Computer consultants advise that you should consider data that you store on floppy disks to be temporary. Computer consultants , designers of floppy disk technology, and manufacturers of floppy disks recommend that you back up any data that you store on floppy disks. Some advisors even suggest that you back up floppy disk stored data at least twice.

Installing The Floppy Disk Drive

The floppy disk drive assembly mounts in a drive cage along with the computer's hard drive. The cage mounts in an opening at the top front of the FX Series' common equipment cabinet.

Mounting The Floppy Disk Drive In The Cage

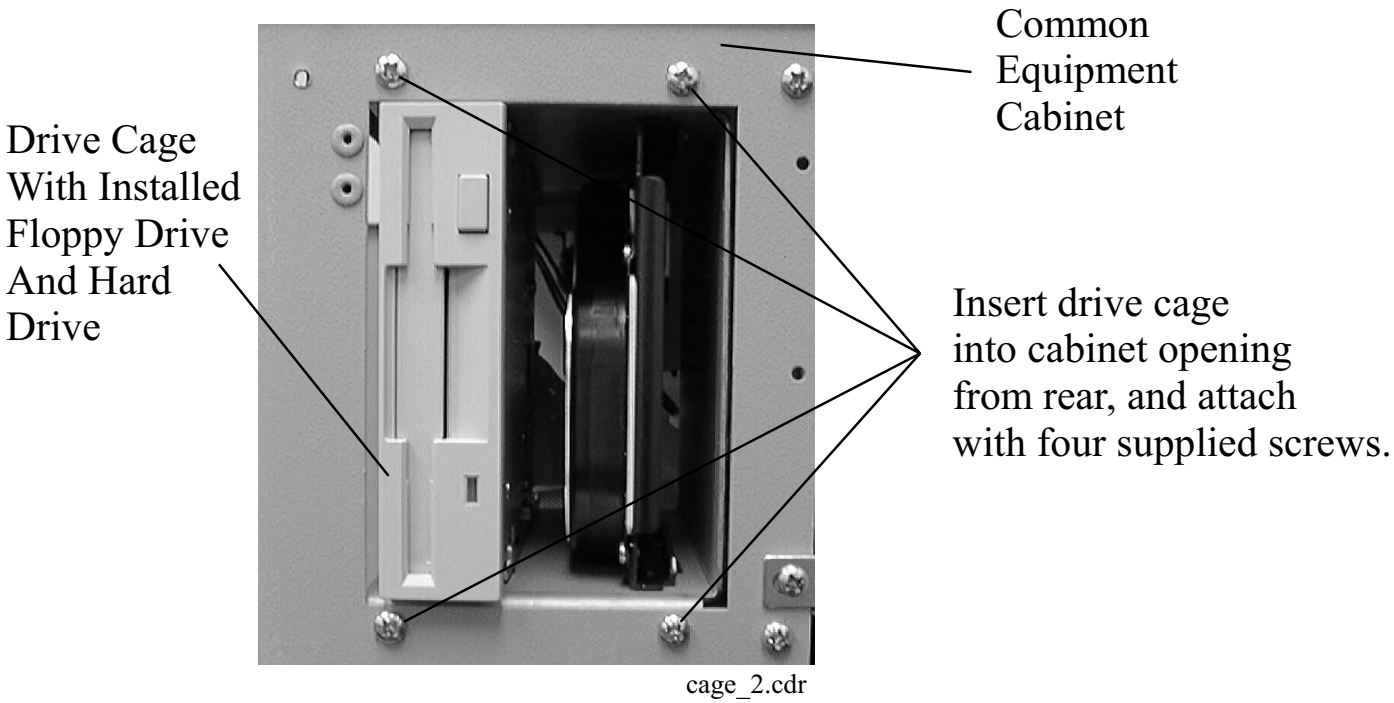
Mount the floppy disk drive in the drive cage and attach it to the cage with the four supplied screws—two on each side of the cage.



Installing The Drive In The Drive Cage

Mounting The Drive Cage In The Cabinet

Mount the drive cage in the common equipment cabinet by inserting it from the inside of the cabinet into the opening at the top front of the cabinet, and attaching it with the four supplied screws..


Common Equipment Cabinet
Drive Cage With Installed Floppy Drive And Hard Drive
Insert drive cage into cabinet opening from rear, and attach with four supplied screws.
cage_2.cdr

Installing The Drive Cage In The Cabinet

Connecting The Floppy Disk Drive

There are two cable connections that you must make to the floppy disk drive—the power connection, and the IDE data connection.

Connecting The Floppy Drive Power Plug

The computer power supply's multipurpose cable provides a plug that mates with the floppy disk power connector. To make the power connection take the following steps:

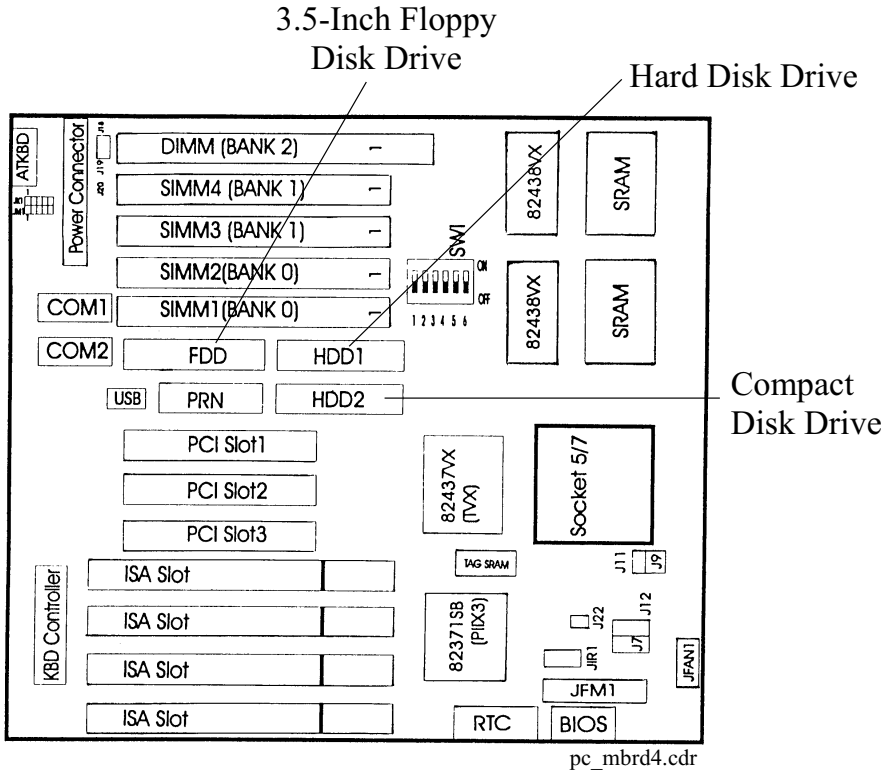
1. Locate one of the smaller white plugs attached to the power cable bundle. There are several available. Choose the one that is most convenient to use.

2. The power plug is keyed—it is not possible to connect it improperly. Simply locate the floppy drive's power connection at the rear of the floppy drive assembly chassis, and mate the connectors.

Connecting The Floppy Drive IDE Data Cable

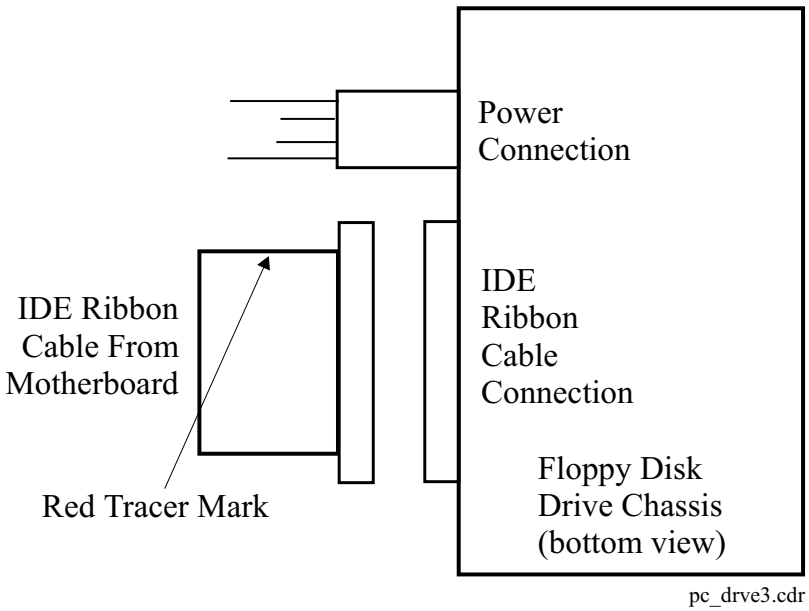
The IDE data cables are the flat ribbon cables that connect between the computer's motherboard and the floppy disk drive. The IDE cables are keyed on the motherboard end. You can only connect them to the motherboard in one orientation. This is not the case when you connect them to the drive assemblies. At these connections, **there are two considerations that you must note:**

1. IDE ribbon cables provide several connectors along their length. This allows one data cable to serve two drives when that need occurs. In the case of the floppy drive in the FX Series system computer, use the first connector on the cable that properly mates with the floppy disk drive's IDE data connector.



NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Motherboard's Floppy Drive IDE Connection



Orienting The IDE Connection

2. **The IDE connector is not keyed**. The proper orientation is to connect the pin 1 of the ribbon cable connector to the pin 1 of the disk drive connector. Another method to help orient the connection properly is to align the cable connector so that its red tracer marking is closest to the floppy disk drive's power connector. Sometimes it is hard to discern these connector markings making it possible to mate the connection improperly. A sure indication of improper connection is a steady-on condition of the disk drive's status light when you operate the drive. Should the drive's status light remain on steady, power down the system, and reverse the mating of the drive's IDE connection.

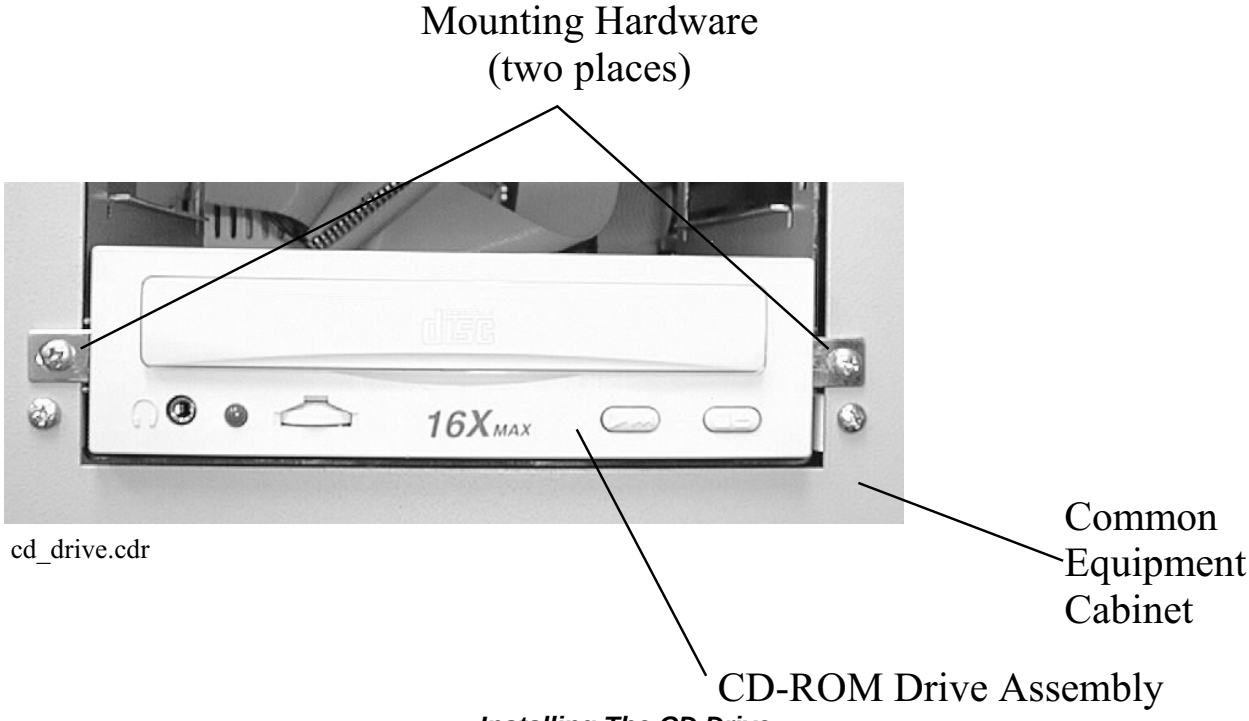
6 Installing The Compact Disk (CD–ROM) Drive

The FX Series system computer provides a compact disk (CD–ROM) drive assembly. The CD–ROM is a read-only data device that stores large amounts of data (typically, one CD–ROM stores up to 640 Mb of data). Producers of software often make their application programs available on CD–ROM because of its ability to store large files of data on one disk. By including a CD–ROM drive assembly, the FX Series system computer provides a means for you to load large application programs without handling large quantities of floppy disks.

Installing The CD–ROM Drive

The CD–ROM drive mounts in an opening on the FX Series common equipment cabinet that is to the right of the floppy drive/hard drive cage opening and just above the front panel.

Mount the CD–ROM drive in the common equipment cabinet by inserting it from the front of the cabinet into the opening, and attaching it with the two supplied screws.



cd_drive.cdr

Installing The CD Drive

Connecting The CD–ROM Drive

There are two cable connections that you must make to the CD–ROM drive—the power connection, and the IDE data connection.

Connecting The CD–ROM Drive Power Plug

The computer power supply's multipurpose cable provides a plug that mates with the CD–ROM drive power connector. To make the power connection take the following steps:

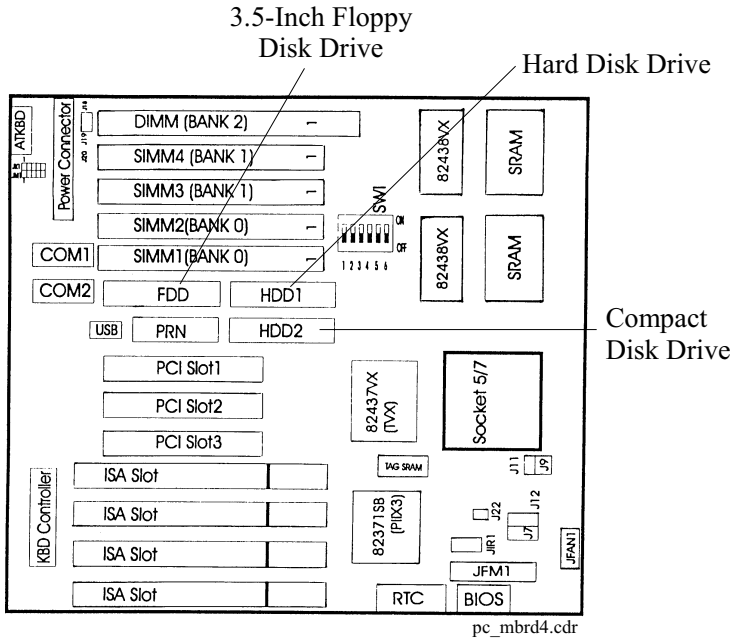
1. Locate one of the large white plugs attached to the power cable bundle. There are several plugs available. Choose the one that is most convenient to use.

2. The power plug is keyed, and it is not possible to connect it improperly. Simply locate the hard drive's power connection at the rear of the hard drive assembly chassis, and mate the connectors.

Connecting The CD–ROM Drive IDE Data Cable

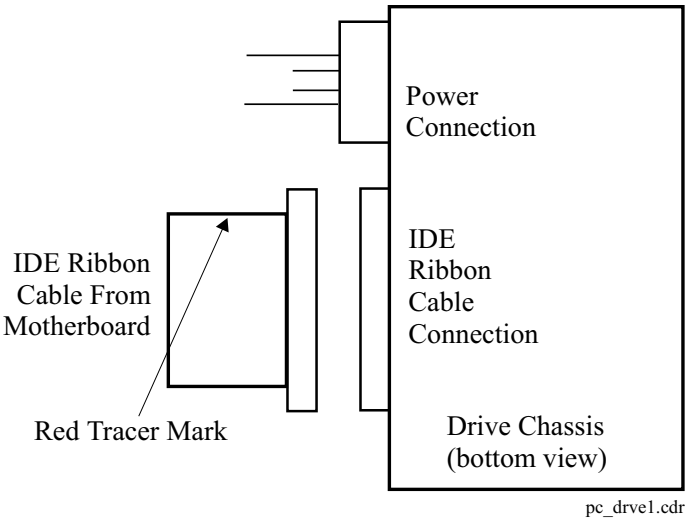
The IDE data cables are the flat ribbon cables that connect between the computer's motherboard and the CD-ROM drive. The IDE cables are keyed on the motherboard end. You can only connect them to the motherboard in one orientation. This is not the case when you connect them to the drive assemblies. At these connections, **there are two considerations that you must note:**

1. IDE ribbon cables provide several connectors along their length. This allows one data cable to serve two drives when that need occurs. In the case of the CD-ROM drive in the FX Series system computer, use the first connector on the cable that properly mates with the hard disk drive's IDE data connector.



NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Motherboard's CD-ROM Drive Connection



Orienting The IDE Connection

2. **The IDE connector is not keyed**. The proper orientation is to connect the pin 1 of the ribbon cable connector to the pin 1 of the drive connector. Another method to help orient the connection properly is to align the cable connector so that its red tracer marking is closest to the drive's power connector. Sometimes it is hard to discern these connector markings making it possible to mate the connection improperly. A sure indication of improper connection is a steady-on condition of the drive's status light when you operate the drive. Should the drive's status light remain on steady, power down the system, and reverse the mating of the drive's IDE connection.

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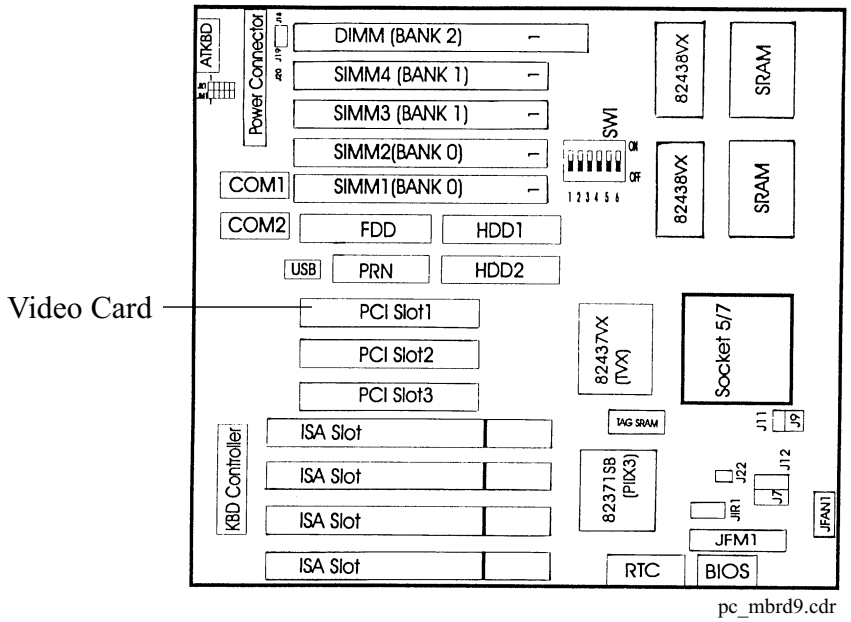
7 Installing The Video Card

The video card provides the interface between the FX Series system computer and the video monitor. It provides standard resolutions and color depths to the Computer/Telephony Integration (CTI) application software that is available for use with the FX Series system.

You must install the video card in the first PCI slot. The illustration points out this location. Install the video card in the manner described below.

Typical FX Series System Computer Motherboard



pc_mbrd9.cdr

NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Motherboard's Video Driver Card Connection

1. Notice that the video card has a wide metal connector bracket along one edge that contains a 15-pin female cable connector. This is the connection for the video monitor. You must remove the blank plate from the common equipment cabinet that covers the opening in front of the first PCI slot to make room for the video card's connector bracket. Save the screw because you will need it later.

2. The card's edge connector is keyed so you can only mate the card to the motherboard connection in one orientation. Align the card's metal connector bracket with the opening in the cabinet, and mate the card to the motherboard's first PCI slot. Do not force the card into the connection—it should slide into place with gentle pressure when oriented properly.

3. Once you have mated the card with the motherboard, secure the card by attaching its metal connector bracket to the common equipment cabinet using the screw removed in step 1. This action secures the card in place and provides a rigid connection for the video monitor cable.

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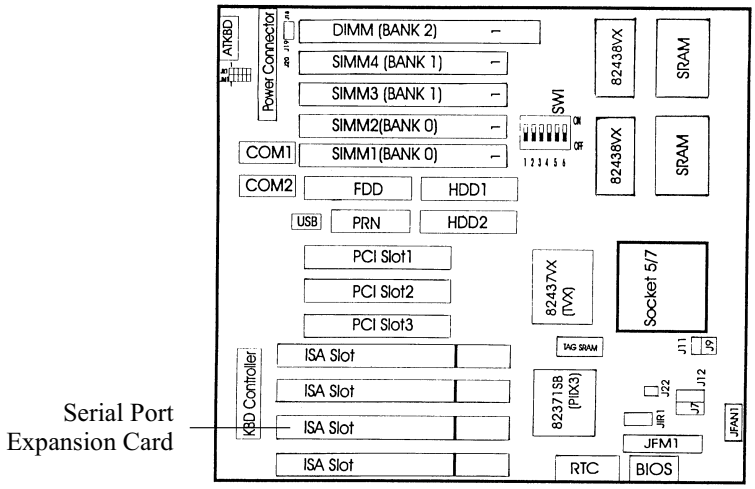
8 Installing The Serial Port Expansion Card

The serial port expansion circuit card provides the computer with four additional serial ports. Extra serial ports are very important when site requirements dictate that the FX Series system provide several different Computer/Telephony Integration (CTI) applications.

You must install the serial port expansion card in the third ISA slot. The following illustration points out this location. Install the serial port expansion card in the manner described below.

Typical FX Series System Computer Motherboard



pc_mbrd5.cdr

NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Serial Port Expansion Card Connection

1. Notice that the card has a wide metal connector bracket along one edge that contains a multiple-pin cable connector. This connector accepts a breakout cable that makes the individual serial data connections available. You must remove the blank plate from the common equipment cabinet that covers the opening in front of the third ISA slot to make room for the card's connector bracket. Save the screw because you will need it later.

2. The card's edge connector is keyed so you can only mate the card to the motherboard connection in one orientation. Align the card's metal connector bracket with the opening in the cabinet, and mate the card to the motherboard's third ISA slot. Do not force the card into the connection—it should slide into place with gentle pressure when oriented properly.

3. Once you have mated the card with the motherboard, secure the card by attaching its metal connector bracket to the common equipment cabinet using the screw removed in step 1. This action secures the card in place and provides a rigid connection for the serial data device cables.

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9 Installing The IVPC

The Comdial Integrated Voice Processing Card (IVPC) is a proprietary, digital, four-port voice processing card that, along with the Versatile Voice Processing (VVP) application software, provides a full-featured voice mail and automatic attendant application for system users. The IVPC allows connection between digital station ports on the telephony portion and the computer portion of the FX Series system. The IVPC and associated cables provide the electronic interface while the VVP application software provides the user interface to the IVPC.

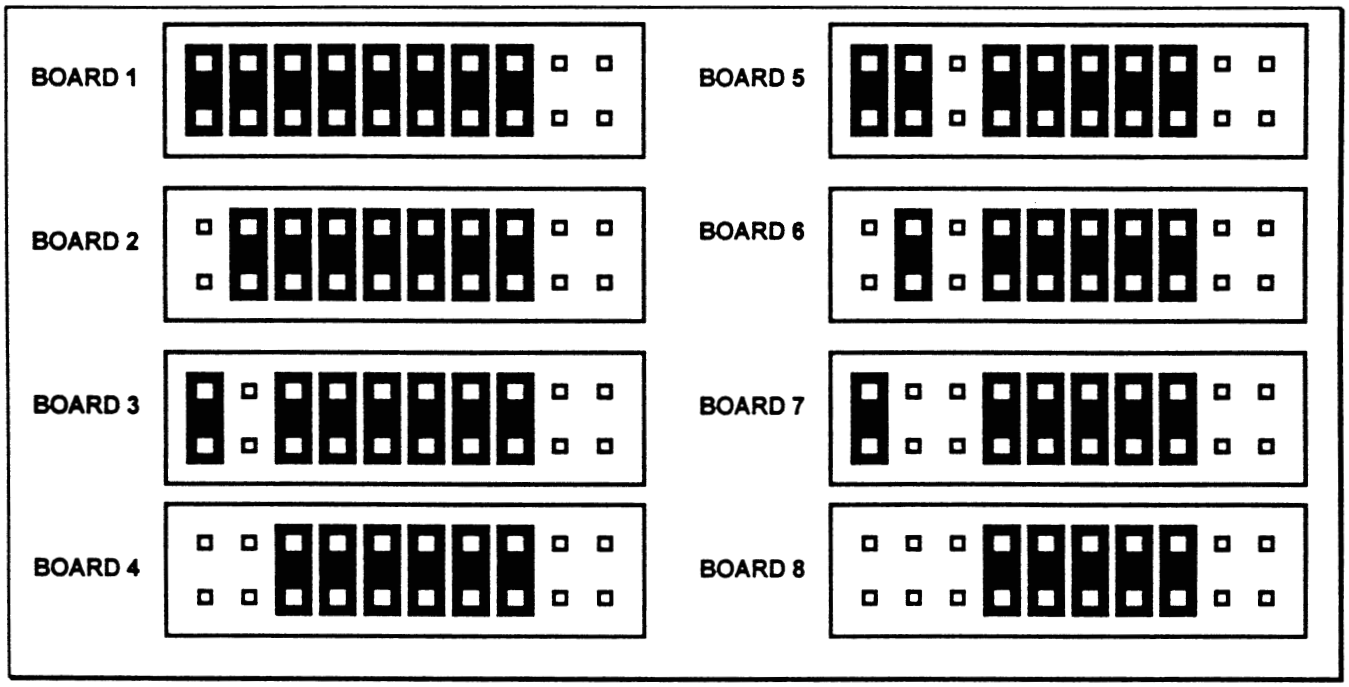
Understanding The IVPC Characteristics

The IVPC cable-connects to a digital station port and provides four voice processing ports supplied to two standard modular telephone jacks, which are configured as RJ-14C jacks. The left jack supplies voice ports one and two and the right jack supplies voice ports three and four. Port one is the clock master port and all four ports synchronize on port one's timing; therefore, you must connect at least port one of the IVPC to a digital station port.

It is important to understand that the system does not automatically mark the four voice mail ports as such. You must program the digital station ports to be voice mail ports before the VVP or Small Office software will function properly.

Strapping The IVPC

You can install two or more IVPCs in the FX Series system computer provided you arrange for each IVPC to have its own I/O address. You set the I/O address for the IVPC by positioning straps on the IVPC board. The strapping block is located at the corner of the card.



vvp-strp.cdr

Placing The IVPC I/O Address Straps

Installing The IVPC

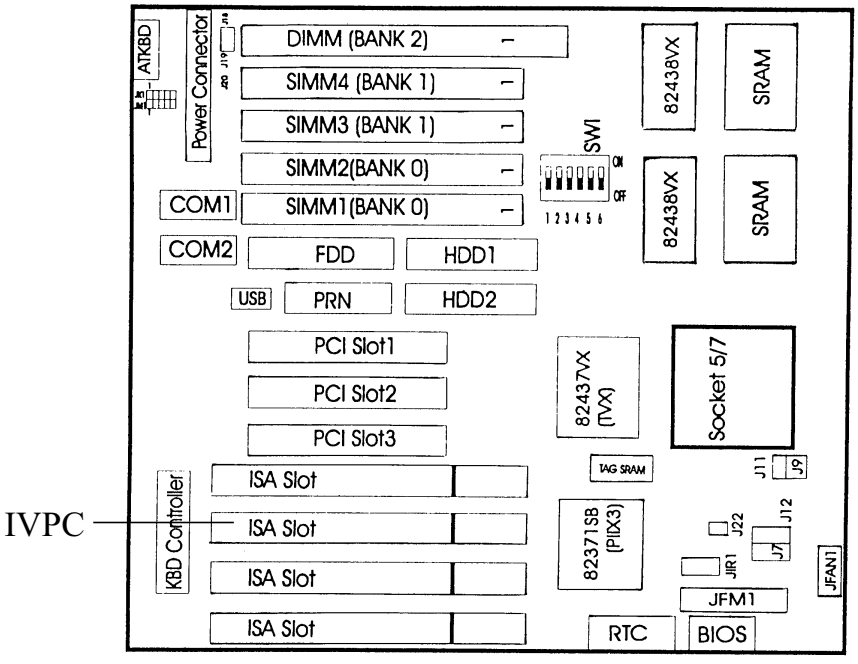
You must install the IVPC in the second ISA slot.

1. Notice that the card has a wide metal connector bracket along one edge that contains the voice processing ports. These are connections for telephony equipment. You must remove from the common equipment cabinet the blank plate that covers the opening in front of the second ISA slot to make room for the card's connector bracket. Save the screw because you will need it later.

2. The card's edge connector is keyed so you can only mate the card to the computer's motherboard connection in one orientation. Align the card's metal connector bracket with the opening in the cabinet, and mate the card to the motherboard's second ISA slot. Do not force the card into the connection—it should slide into place with gentle pressure when oriented properly.

3. Once you have mated the card with the motherboard, attach the card's metal connector bracket to the equipment cabinet using the screw removed in step 1. This action secures the card in place and provides a rigid connection for telephony equipment cables.

Typical FX Series System
Computer Motherboard



pc_mbrd7.cdr

NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Motherboard's IVPC Card Connection

Connecting The IVPC

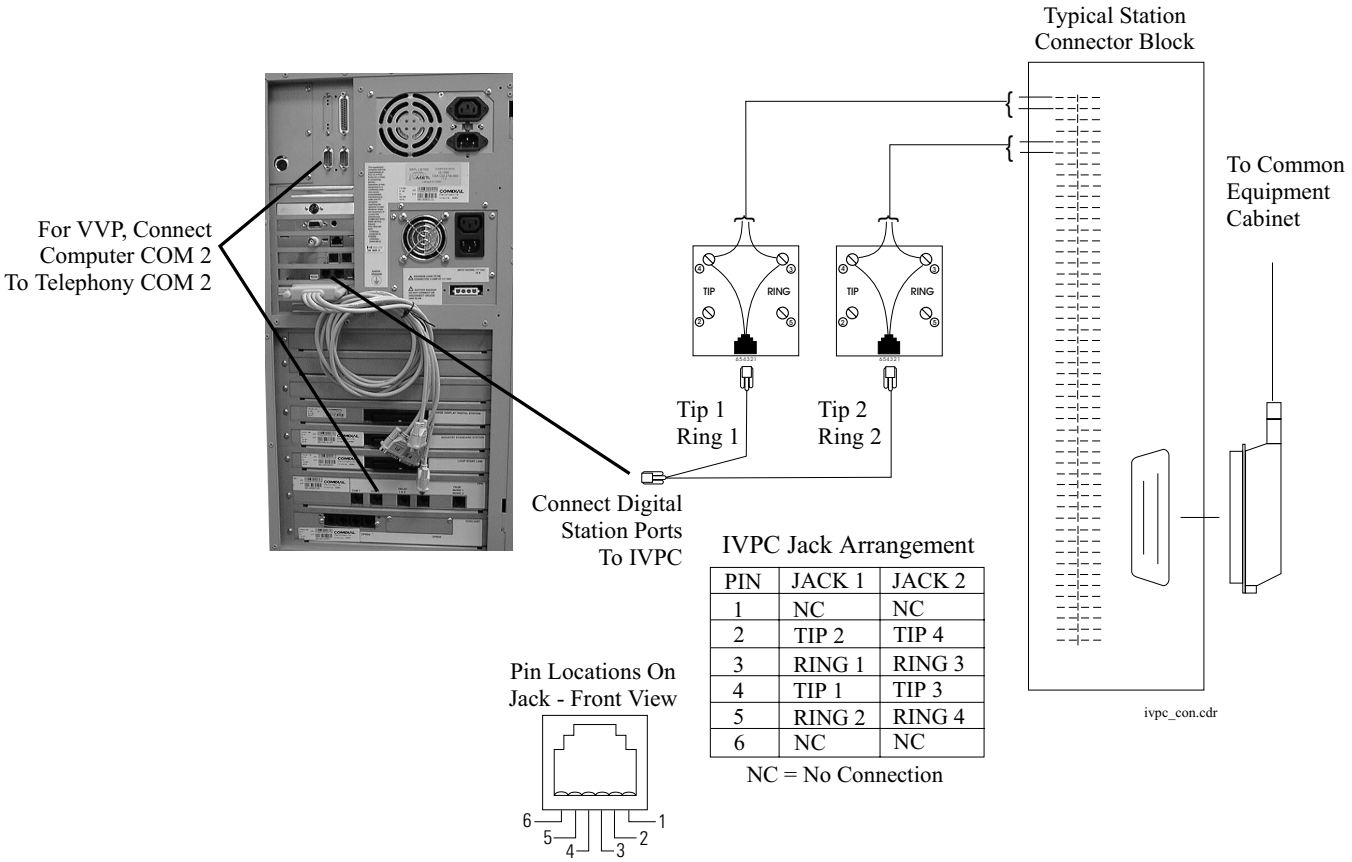
Connect the IVPC voice processing ports to digital station ports using standard four-conductor telephone line cords.

CAUTION

To guard against cross-talk between the two wire pairs in a single four-wire line cord be sure to split the two tip and ring pairs as soon as they emerge from the IVPC's modular jacks.

Also, you must connect the four ports of an IVPC within the same eight-port group on a digital station card. You also must not split the IVPC ports between two digital station cards or between the upper eight station ports and lower eight station ports of a single 16-port digital station card.

Connect the serial data cable between the computer's COM1 connector and the COM1 jack on the telephony portion of the system.



IVPC Jack Arrangement

PIN	JACK 1	JACK 2
1	NC	NC
2	TIP 2	TIP 4
3	RING 1	RING 3
4	TIP 1	TIP 3
5	RING 2	RING 4
6	NC	NC

NC = No Connection

Pin Locations On
Jack - Front View

Wiring The IVPC Card

Programming The Telephone System For IVPC Operation

When you plan for a digital station port to become a voice mail port, you must program the station port as a voice mail port.

Use entries on the VMMI programming Peripherals/Voice Mail/Extension Table menu to do this.

At default, an IVPC station port is programmed for voice first signaling (that is; the station does not ring when called). When you add the IVPC port to the voice mail link table, the station port automatically becomes a tone first signaling port regardless of the voice or tone first setting for the station port in station programming.

Troubleshooting The IVPC Installation

Do not bridge DTMF intercepting test equipment across the line cord that runs between an IVPC port and a digital station port. A *DTMF grabber* is an analog device and it will not work on a digital IVPC port.

The four ports of an IVPC identify themselves to, or synchronize with, the telephone system (that is: they send the *phone type* signal). They do this the first time the voice card driver (known as RHETDRV) loads in memory after initial computer power-up. Any subsequent power-up does not cause the IVPC ports to re-synchronize with the switch.

Running RDSPEXIT or performing a Ctrl-Alt-Del (that is; performing a soft reset operation) does not reset the IVPC. You must cycle the computer's power to reset the IVPC if it becomes necessary.

If one or more ports on an IVPC do not synchronize with the telephone system (for example; they do not appear as *present* with the S in the telephone system's *station types* printout),

disconnect both lines cords from the IVPC board,

wait for at least two seconds (this is the time-out duration coded in the IVPC firmware to detect that the ports are off-line),

reconnect the line cords (top IVPC jack first).

If the IVPC ports still do not synchronize, cycle the computer's power. If this action does not cause the IVPC ports to synchronize, the IVPC may be defective and require replacement.

When an IVPC looses synchronization with the telephone (for example; if you disconnect an IVPC port from the digital station port), the VVP application causes a *No comm* display for the port status and causes an alarm to sound and the computer monitor to display the following error message:

SYSTEM ERROR 5209: IVPC port x lost communication with the phone system

When an IVPC reestablishes communication with the telephone system (for example after an IVPC port was disconnected and reconnected to a signal station port), the VVP application sounds an alarm and displays the following error message (and the system logs errors 5208 and 5209 in the ERROR.LOG file):

SYSTEM ERROR 5208: IVPC port x reestablished communication with the phone system

If you ever reset the telephony portion of the FX Series system, it is a good practice to also cycle the computer's power.

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10 Installing The Network Interface Card

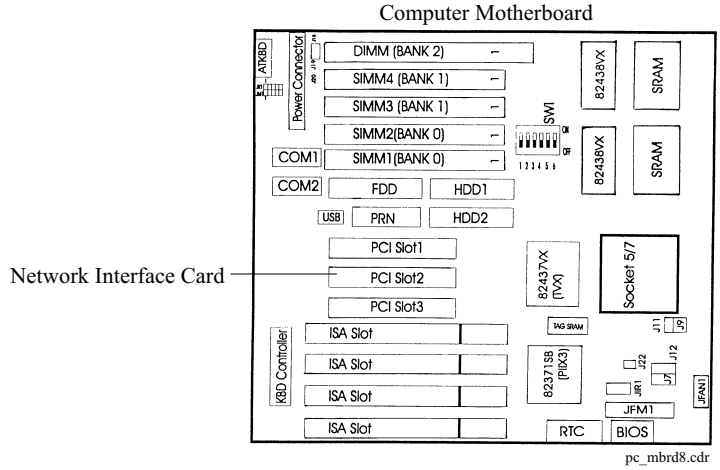
The network interface card (NIC) provides the FX Series system computer with an Ethernet interface between it and external data equipment. Ethernet is a data protocol for creating a local area network or LAN that connects together devices such as computers, data printers, work stations, terminals, and so forth within the same location.

Installing The Network Card

You must install the NIC in the second PCI slot. The following illustration points out this location. Install the network interface card in the manner described below.

1. Notice that the card has a wide metal connector bracket along one edge that contains cable connectors. These are connections for the external network cables. You must remove the blank plate from the common equipment cabinet that covers the opening in front of the second ISA slot to make room for the card's connector bracket. Save the screw because you will need it later.

Typical FX Series System Computer Motherboard



NOTE: Your system's motherboard may differ from this typical example. Refer to the literature included with your system for complete details.

Locating The Motherboard's Network Card Connection

2. The card's edge connector is keyed so you can only mate the card to the motherboard connection in one orientation. Align the card's metal connector bracket with the opening in the cabinet, and mate the card to the motherboard's second PCI slot. Do not force the card into the connection—it should slide into place with gentle pressure when oriented properly.

3. Once you have mated the card with the motherboard, secure the card by attaching its metal connector bracket to the common equipment cabinet using the screw removed in step 1. This action secures the card in place and provides a rigid connection for the external network cables.

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Publication Index

A

AC Power, Connecting 3-3

C

CD-ROM Drive, Connecting The 6-2
CD-ROM Drive, Installing The. 6-1
Component, Handling Static-Sensitive 1-2
Components, Connecting Power To 3-2
Components, Introducing
The FX Series System Computer 1-1
Connecting AC Power. 3-3
Connecting Power
To The Internal Components. 3-2
Connecting The
CD-ROM Drive IDE Data Cable. 6-3
Connecting The
CD_ROM Drive Power Plug. 6-3
Connecting The CD–ROM Drive 6-2
Connecting The Floppy
Disk Drive IDE Data Cable. 5-4
Connecting The
Floppy Disk Drive Power Plug 5-3
Connecting The Floppy Disk Drive. 5-3
Connecting The Hard
Disk Drive IDE Data Cable. 4-3
Connecting The Hard
Disk Drive Power Plug 4-3
Connecting The Hard Drive 4-3

D

Detailing The
Motherboard Device Locations. 2-2
Device Locations,
Detailing The Motherboard. 2-2

F

Floppy Disk Drive, Installing The. 5-1
Floppy Drive, Connecting The 5-3
Floppy Drive, Mounting In The Cage. 5-1

H

Handling Static-Sensitive Components. 1-2
Hard Drive, Connecting The 4-1
Hard Drive, Installing The. 4-1
Hard Drive, Mounting In The Cage. 4-1

I

IDE Cable, Connecting
The CD_ROM Drive 6-3
IDE Cable, Connecting The Floppy Drive . . 5-4
IDE Cable, Connecting The Hard Drive 4-3
Installing The
Compact Disk (CD–ROM) Drive 6-1
Installing The Computer Motherboard 2-1
Installing The Floppy Disk Drive 5-1
Installing The FX Series System
Computer Power Supply. 3-1
Installing The Hard Disk Drive 4-1
Installing The IVPC 9-1, 9-2
Installing The Motherboard. 2-1
Installing The Multiple Serial Port Card 8-1
Installing The Network Interface Card 10-1
Installing The Power Supply 3-1
Installing The Video Card 7-1
Internal Modem, Strapping The Card 9-1
Introducing The FX Series
System Computer Components 1-1

IVPC Characteristics,
Understanding The 9-1
IVPC Installation,
Troubleshooting The 9-4
IVPC, Installing The 9-1, 9-2
IVPC Operation, Programming
The Telephone System For. 9-4
IVPC, Strapping The 9-2

M

Motherboard,
Installing The Computer 2-1
Mounting the Drive
Cage In The Cabinet. 4-2, 5-2
Mounting The Floppy
Disk Drive In The Cage. 5-1
Mounting The Hard Disk
Drive In The Cage 4-1
Multiple Serial Port Card,
Installing The. 8-1

N

Network Card, Installing The 10-1

P

Power Plug,
Connecting The CD-ROM Drive 6-3
Power Plug,
Connecting The Floppy Drive 5-3
Power Plug,
Connecting The Hard Drive 4-3
Power Supply Installing The 3-1
Programming The Telephone System
For IVPC Operation 9-4

S

Strapping The IVPC 9-2

T

Troubleshooting The IVPC Installation 9-4

U

Understanding The IVPC Characteristics . . . 9-1

V

Video Card, Installing The 7-1

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